BURROWING HABITS OF TWO SUBSPECIES OF *DIPODOMYS MERRIAMI* IN CALIFORNIA AND UTAH

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In connection with a study on the parasitic burden of *Dipodomys merriami merriami* Mearns and *Dipodomys merriami vulcani* Benson, the burrowing and nesting habits of the species were observed. Sites of the study were Panamint Valley, California, and Dixie State Park, Utah. The latter locality is in the most northerly extension of the range of the species in Utah (Burt and Grossenheider, 1964:155).

In 1964, Anderson and Allred reported that burrows of *D. microps* at the Nevada Nuclear Test Site rarely exceeded 50 cm, whereas burrows in Panamint Valley reached a maximum depth of 140 cm and burrows in Dixie State Park, a maximum depth of 163 cm. This discrepancy is probably due to the fact that Anderson and Allred studied an entirely different environment where the soil profiles showed caliche, which prevents penetration of the animals deeper into the soil. In those parts of Panamint Valley and Dixie State Park that were studied, however, no hardpan layer existed.

Only actual burrows, not subsidiary burrows, were examined intensively in the study of Panamint Valley and Dixie State Park, because subsidiary burrows are used exclusively for escape. Subsidiary burrows showed a depth of between 30 to 48 cm in both locations.

In April 1971, three burrows were excavated in Panamint Valley, California, in a *Prosopis-Atriplex* community. Burrows of *D. m. merriami* were located under mesquite in sand dunes, as described by Baker (1956). No rocks, herbs, or grasses were found in the immediate vicinity. Two burrows of *D. m. vulcani* were examined in May 1971 in Dixie State Park, Utah. These were found in a *Larrea-Franseria* community where volcanic rock strata alternated with sandstone. Grasses and herbs were present in this area. However, no rocks were found in the sand.

Since three of the burrows were located in old sand dunes, two shovels were used effectively to excavate the burrows. The tip of one shovel was placed into the opening, preventing the burrow from caving in, while the second shovel was used for sand removal.

The measurements of the Panamint Valley, California, burrows are as follows:

	Depth to Moist Soil	Length of Tunnel	Depth of Tunnel
Burrow No. 1	26 cm	520 cm	140 cm
Burrow No. 2	55 cm	300 cm	85 cm
Burrow No. 3	120 cm	330 cm	120 cm

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Burrow No. 1 reached a depth of 50 cm below the surface at a length of 320 cm. Thereafter, the grading was uniformly steep. Burrow No. 3 was located in an old sand dune.

Data for Dixie State Park, Utah, are as follows:

	Depth to Moist Soil	Length of Tunnel	Depth of Tunnel
Burrow No. 1	35 cm	260 cm	75 cm
Burrow No. 2	55 cm	365 cm	163 cm

All nests measured about 20 cm in diameter. They were very clean and contained pieces of chewed-up wood and some beetles. The nests in the Panamint Valley area also contained a few mesquite seeds; and the nests in the Dixie State Park location, seeds of Creosote and Franseria. Fecal droppings were found near the entrance of each nest. The humidity of the three nests studied in Panamint Valley was about 70% to 80%, and the soil temperature around the nests averaged 17 C.

Discussion

A close relationship exists between soil moisture, ground temperature, elevation, and the burrowing habits of *D. merriami*.

The burrows in Panamint Valley had a minimum depth of 85 cm and reached a maximum depth of 140 cm. In Dixie State Park, 75 cm was recorded as the minimum depth and 163 cm as maximum depth. Apparently, the level of the soil moisture played an important role in the depth of a burrow. Burrow No. 1 in Panamint Valley, for instance, was located in shallow sand where visible soil moisture began at a 26 cm depth, whereas burrow No. 3 in Panamint Valley was built in a very deep sand dune where visible soil moisture started at a depth of 120 cm. This suggests that the animals dig to a level of relatively permanent soil moisture to make their "nests." Anderson and Allred (1964) observed burrows of *D. microps* at the Nevada Test Site that reached a depth of about 50 cm. This probably is due to the fact that the elevation of Panamint Valley (elev., 325 m) and Dixie State Park (elev., 823 m) is lower than the study area at the Nevada Test Site, which ranges from 915 m to 1525 m elevation.

Since lower elevations have warmer temperatures, the animals seem to dig deeper into the soil to escape the heat. To support this hypothesis, some extreme surface and ground temperatures were measured at Panamint Valley.

Beginning of April 1971	ground temp., 21 C
Beginning of July 1971	constant ground temp., 29.5 C
Beginning of June 1971	maximum surface temp., 56.5 C.

Finally, it was observed that *D. merriami* collects a limited food supply in surface caches built in loose sand which were exposed

possibly by wind action. Surface caches were also mentioned by Reynolds (1958).

Literature Cited

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